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NOTES ON THE BIOLOGY AND DISTRIBUTION OF
PARACOTALPA GRANICOLLIS HALDEMAN

(Coleoptera: Scarabaeidae)¹

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Certain aspects of the biology and distribution of *Paracotalpa granicollis* Haldeman were observed as part of an ecological study at the United States Atomic Energy Commission Nevada Test Site, Nye County, Mercury, Nevada. Apparently little is known about the biology of this species since Ritcher (1958) did not mention it in his review of the Scarabaeidae, although Ritcher (1948) and Saylor (1940) discussed some aspects in the biology of the closely related *P. ursina ursina* (Horn).

The test site is situated in a large transitional area between the Mohave and Great Basin Deserts. The major plant communities are: (1) *Larrea divaricata* Cov. and *Franseria dumosa* Gray, (2) *Lycium pallidum* Miers., (3) *Atriplex confertifolia* (Torr. and Frem.) Wats. and *Kochia americana* Wats., (4) *Coleogyne ramosissima* Torr., (5) *Grayia spinosa* (Hook.) Moq. and *Lycium andersonii* Gray, (6) *Artemisa tridentata* Nutt., (7) *Pinus monophylla* Torr. and Frem. and *Juniperus osteosperma* (Torr.) Little, and (8) *Salsola kali* L. which occupies large areas that were denuded of their original vegetation by nuclear weapons testing. Adult males were observed flying in all of these communities except Piñon-Juniper. They were most numerous in the Grayia-Lycium and Lycium communities, and least numerous in the Coleogyne and Artemisia communities. They preferred sandy bajada soils, but not sandy washes or gullies.

¹ This work was supported (in part) by the Atomic Energy Commission Contract AT(11-1)786.

The earliest date males were observed was January 16, 1961, in the Lycium community and the latest date was April 6, 1961, in the same community. The apparent peak of their flight activity was from February 6 to 12. Daily flights began at sunrise. The peak of daily activity was between 9:30 a.m. and mid-day, although some were observed as late as 2:30 p.m. in the Coleogyne and Artemisia communities. Cloud cover had no detectable influence on the time daily flights began but did reduce the number of beetles in flight. Some emerged from and descended into rodent burrows, but most dug shallow recluses about five inches deep in the soil.

Flight was typical of many scarabaeids. Only males were collected in flight and they were frequently concentrated in small local areas. The two methods used by males to locate females were particularly interesting since mating was probably the primary purpose for their flight. In most cases, females remained in the entrances of their burrows until located by the males. Copulation took place at the entrance, after which the females descended back into their burrows and the males usually resumed flying. The second method involved a tracking procedure. After alighting, the males searched back and forth until the trail was identified, then they followed in rapid pursuit. If the trail was lost or eliminated, they circled until it was found again. Failure to find the trail again usually resulted in their taking flight. Copulation occurred immediately when females were overtaken by males and lasted for one to two minutes. After this the female searched for a suitable burrowing site and the male usually took flight. Several pairs were observed mating on the ground, sometimes as many as eight males tried to mate with one female at the same time.

Copulation was achieved when the female was approached from behind and accomplished after her head had been forced down and abdomen raised by the male's rear legs. One female mated with three separate males, one of them twice. This occurred in approximately five minutes that it took her to find a suitable burrowing site.

Ritcher (1948) observed *ursina* larvae feeding on the larger roots of *Artemisia* at a depth of 6 to 12 inches. Most of the plant species occurring in the areas of adult activity were examined, but no larvae were recovered at the Nevada Test Site. Several dead

adult females were collected from 8 to 12 inches below the ground surface, but eggs or larvae were never recovered.

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BOOK REVIEW

PESTS OF STORED GRAIN AND GRAIN PRODUCTS. By Richard T. Cotton. I + 318 pages. 108 figs. Burgess Publishing Company, 426 S. 6th St., Minneapolis 15, Minn. Price \$5.00.

This publication is an expanded edition of work previously published by Cotton. It consists of 15 instead of 11 chapters. Added chapters include information on rodent and bird pests, protecting stored seed from insect attack, detection of insect infestation, and insect control in the bakery. The other chapters give a complete account of factors that must be taken into consideration in the protection of stored grain and its products. The life long experience of the author in the field is reflected in the clear and understandable manner in which he has presented the subject matter. The book is a must for those persons in the commercial fields who have anything to do with the preservation and protection of stored food products. It furnishes a handy reference to the available information on pests, their habits, and means of protection and preventing damage. The book is assembled in a more durable fashion than the previous works. Although the publication is of greatest value to the commercial field, it should prove to be a valuable and handy reference for students and scientists interested in the general field of stored pests.—A. E. Michelbacher, *University of California, Berkeley*.

MEETING NOTICE

The XIIIth International Congress of Entomology will meet July 3-16, 1964 in London, England.